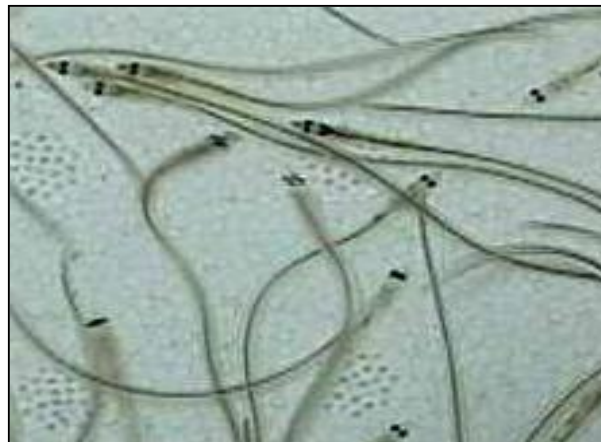




ARE EELS ENDANGERED?

Oceanic Factors & Adaptive Strategies

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INTRODUCTION

Threats to survival (natural and anthropogenic) can act during the oceanic, continental and catchment stages

– and *A. rostrata* and *A. anguilla* show common features

- ❑ Oceanic factors and adaptive strategies

LATER;-

- ❑ Near-continent recruitment factors and strategies

- ❑ Catchment recruitment factors and strategies

- ❑ Relative importance of freshwater eels

- ❑ Conclusions

*['Hypotheses' and individual views in BLUE
+ supporting evidence!]*

INTRODUCTION – OCEANIC ASPECTS

- ❑ Key common features & adaptive strategies of anguillids**
- ❑ Relationships between recruitment and oceanic indices**
- ❑ Possible cause-effect relationships and threats**

ANGUILLID STRATEGIES

NB ELOPOMORPHS ARE 'ANCIENT' IN EVOLUTIONARY TERMS!!

❑ PANMICTIC

❑ 'PERIODIC' LIFE STRATEGISTS (Winemiller)

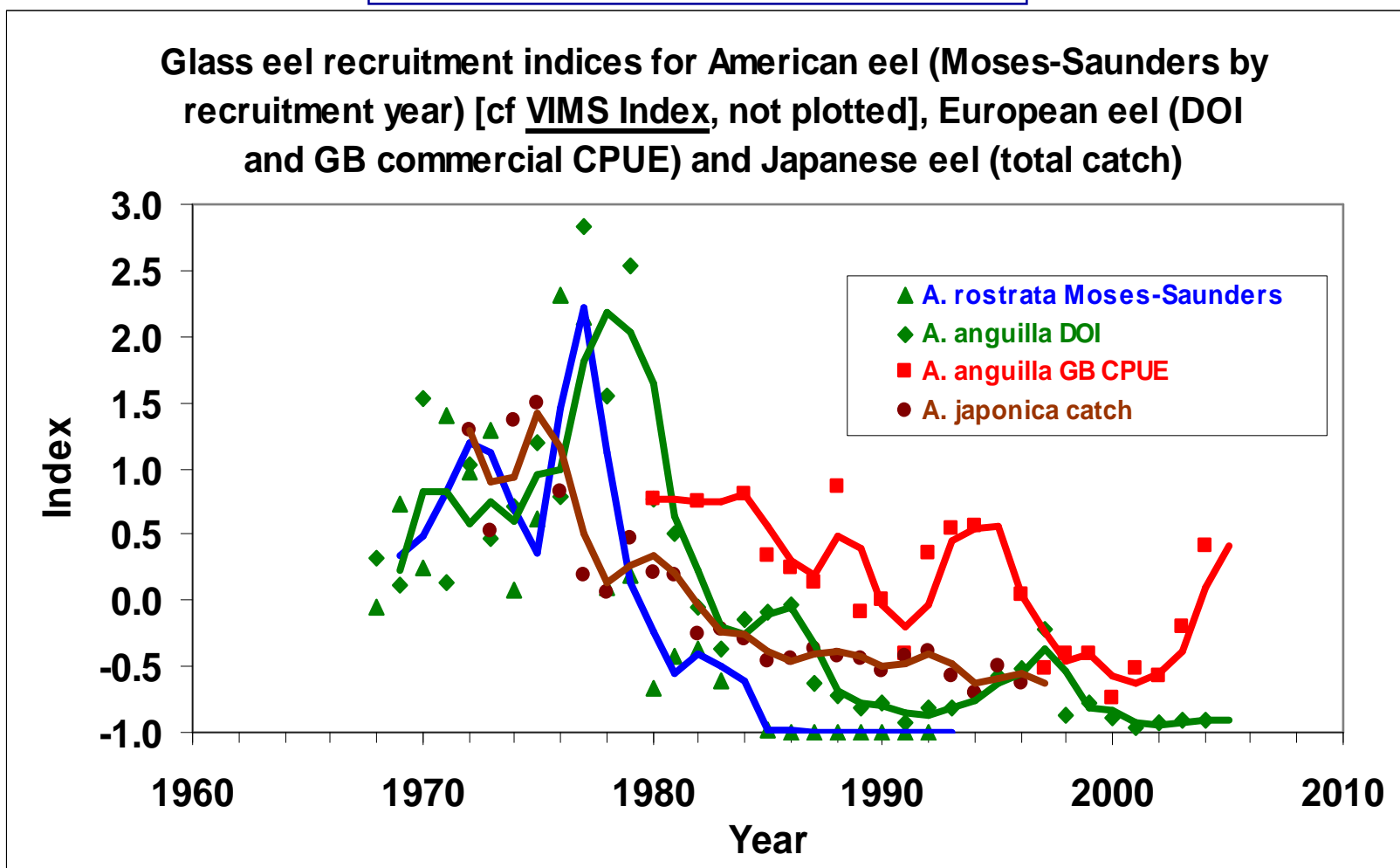
- **Delay maturation to large size (females > 45 cm) with high fecundity**
→ to compensate for VERY high larval mortality

❑ OCEANIC ADAPTIVE STRATEGIES

- **Breed over deep oligotrophic subtropical oceans**
- *Predators & competition* ↓
- **Long migrations**
- *Resource partitioning*
- **Leptocephalus adaptations**
 - ***Nutrition = marine snow and DOM, i.e. low trophic level, only indirectly dependent on phytoplankton***
 - ***Rapid & low energy cost growth of GAGs core***
 - ***Forms energy reserve***

**N. Hemisphere spp. show similar recent recruitment declines
from PEAK late 70-early80s (in nos. and condition factor)
*[plus MANY other synchronous ecological changes]***

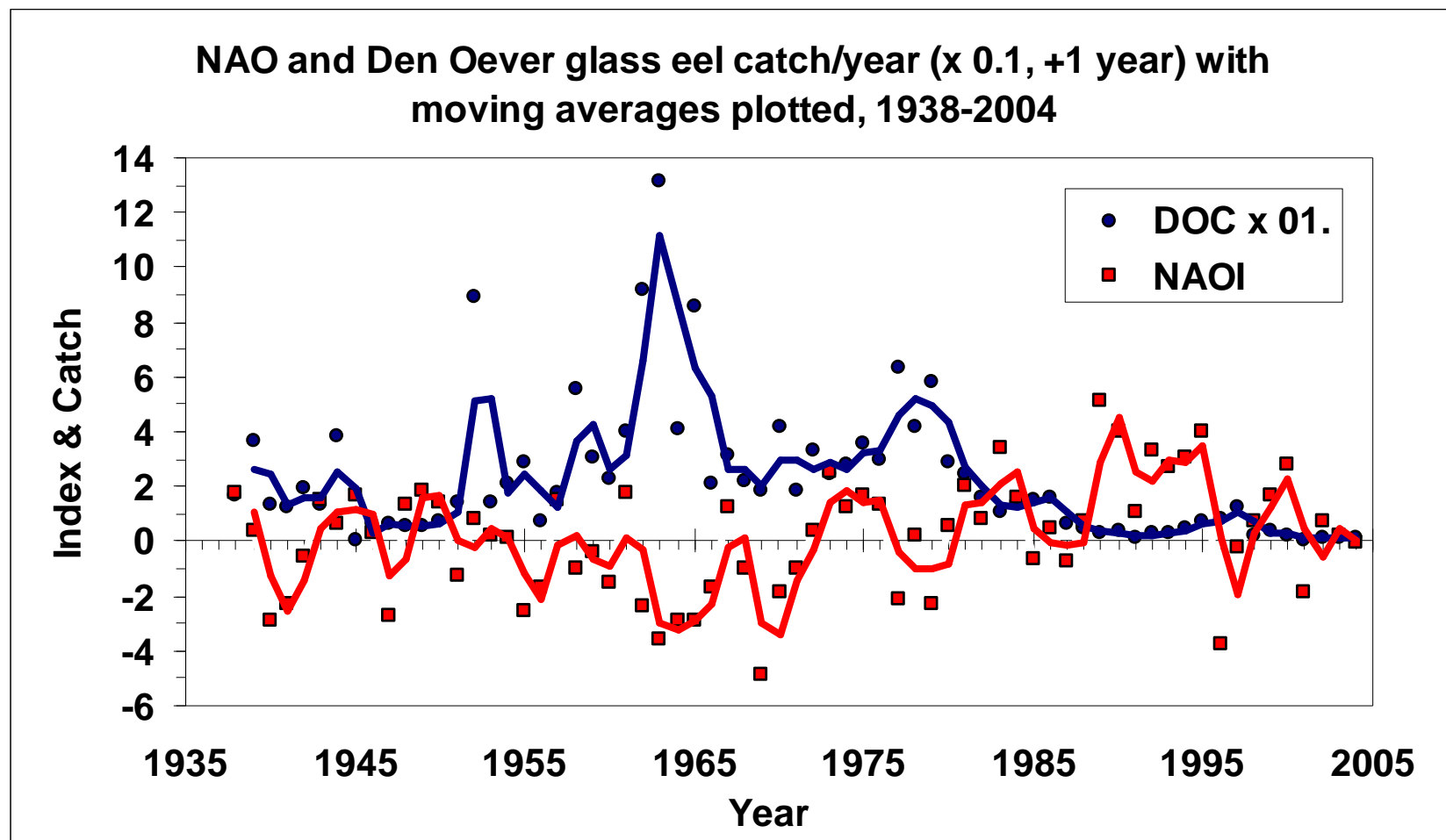
-IMPLYING RELATED CAUSES



OCEANIC-CLIMATE FACTORS HAVE MAJOR IMPACTS ON EELS

e.g. indicated by relationships between recent/historical recruitment and the NAO for *A. anguilla* and for *A. rostrata* (Castonguay)
(and the SOI/ENSO for *A. japonica* (Kimura 2003)

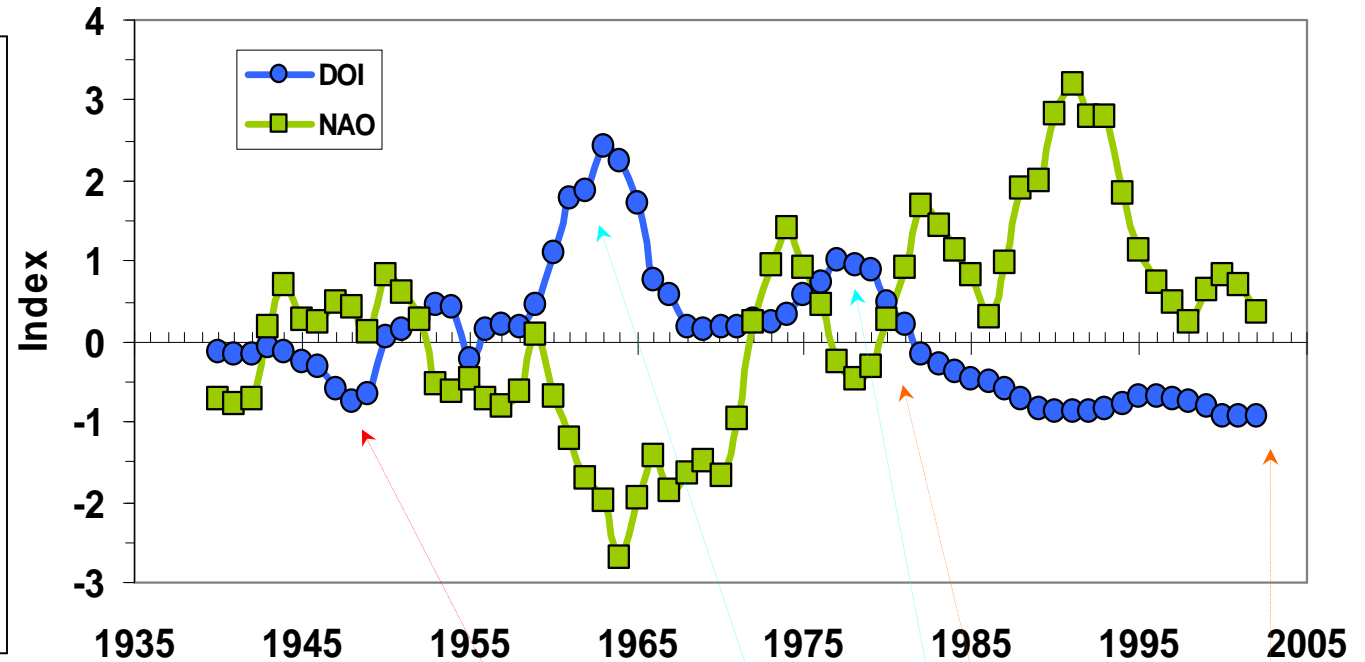
'Best' evidence = LONG TERM Den Oever time series v NAO
- e.g. using very 'noisy' raw data & noting lags ($R^2 = 0.15$);-



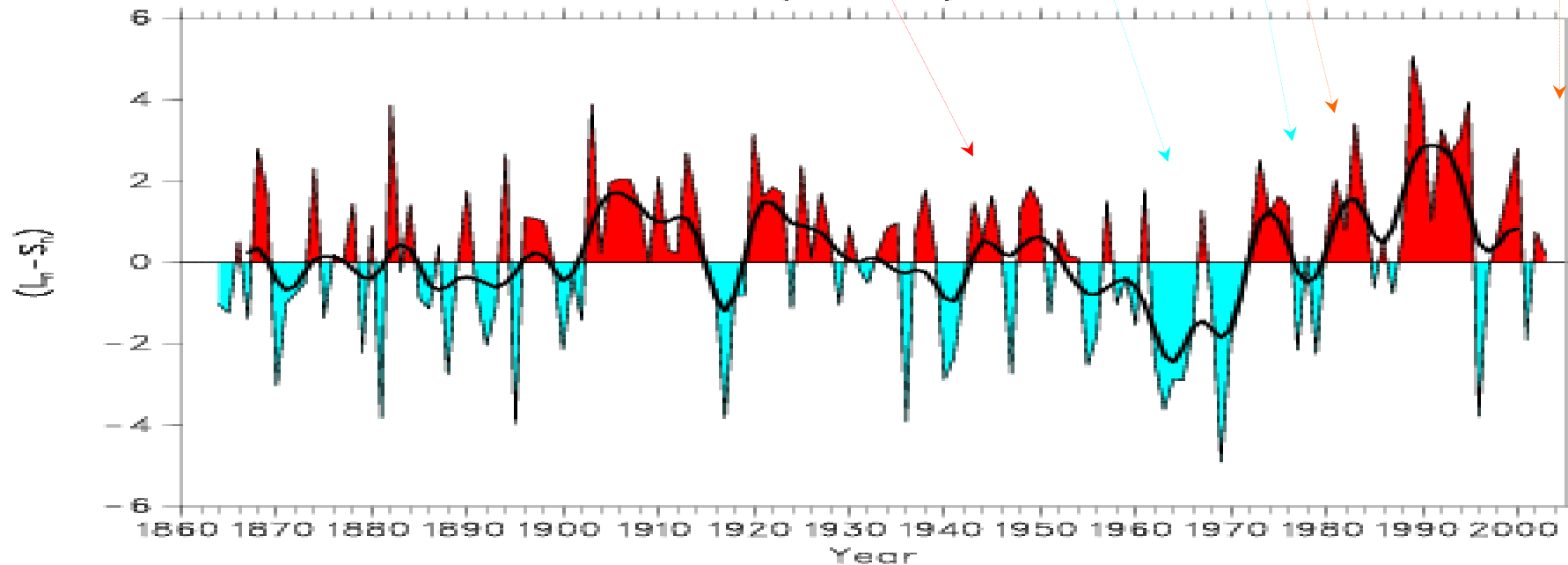
**Clearer
relationships are
shown with
indexing/
averaging
($R^2 = 0.50$)**

*[+ proxy & anecdotal
historical evidence?]*

NAO and DOI (5 year average lagged by 1 year) over 1938-2005



NAO Index (Dec-Mar) 1864-2003

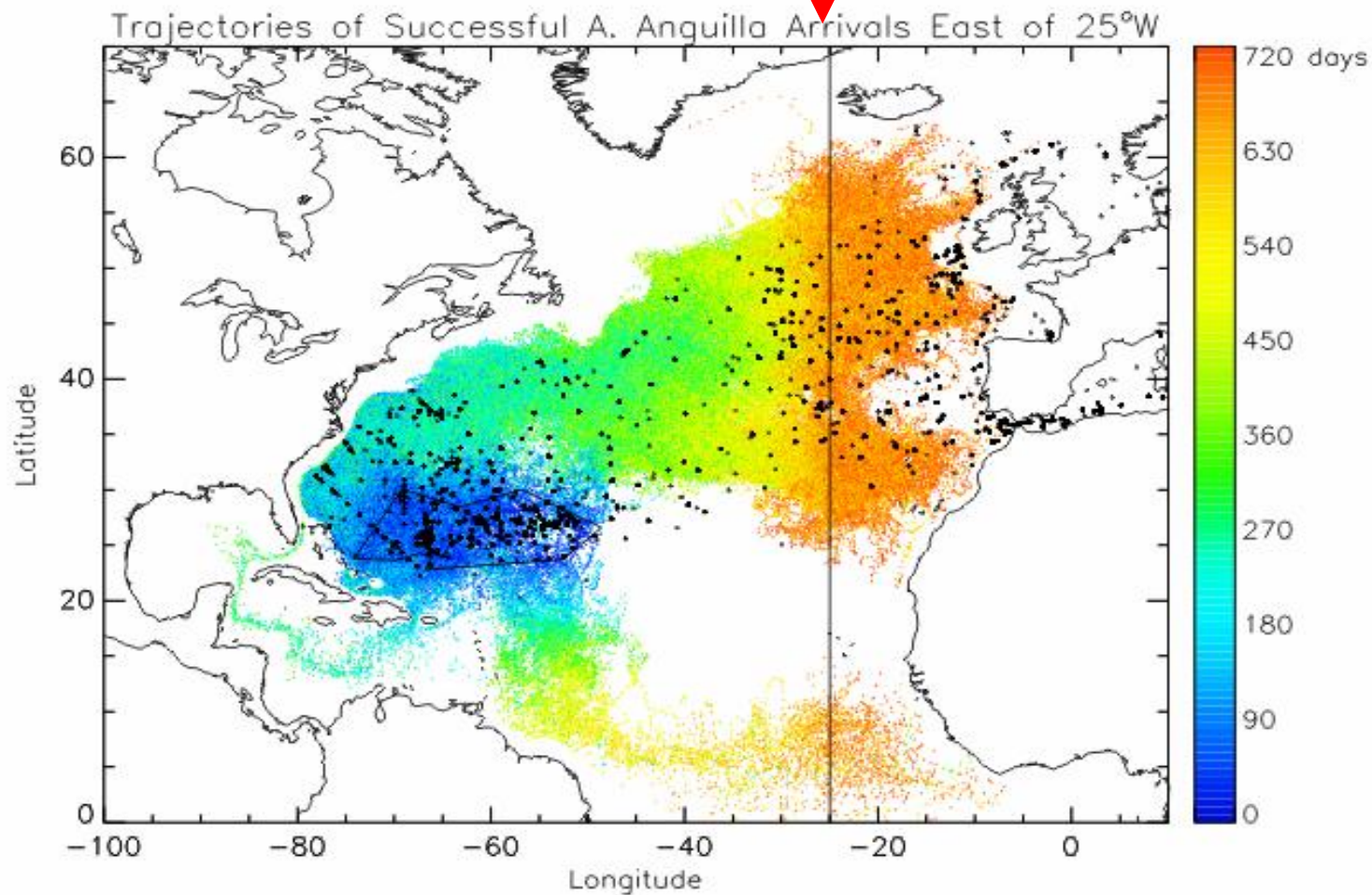


CAUSE-EFFECT RELATIONSHIPS?

OCEANIC-SCALE RECRUITMENT

(Leptocephalus drift modelling by Kettle & Haines, In Press, etc)

NB V. HIGH MORTALITY > 99.3%



CAUSE-EFFECT RELATIONSHIPS (*FOR ALL 3 SPP?*)

- Starvation**
- Advection**
- Mismatches**
- in the breeding areas and/or during migration**

***NOW OVER TO
MICHAEL MILLER AND KEVIN FRIEDLAND
TO DISCUSS POSSIBLE CAUSE-EFFECT RELATIONSHIPS IN
MORE DEPTH***